



INVESTOR IN PEOPLE

**PRIORITY
DOCUMENT**
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

16 DEC 2003
WIPO PCT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

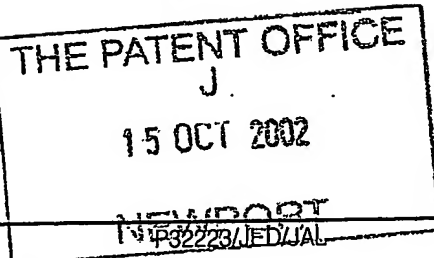
[Signature]

Dated 20 November 2003

Best Available Copy



Request for grant of a patent



The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

2. Patent Application Number
(the Patent Office will fill in this part)

0223964.8

15 OCT 2002

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

Deep Tek Limited
Kilburns House
Newport-on-Tay
Fife
DD6 8PL

Patents ADP number (*if you know it*)

7754534001

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

"Apparatus and a Method for Use in Handling a Load"

5. Name of your agent (*if you have one*)

Murgitroyd & Company

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

165-169 Scotland Street
Glasgow
G5 8PL

Patents ADP number (*if you know it*)

1198015

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application number
(*if you know it*)

Date of filing
(*day / month / year*)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(*day / month / year*)

8. Is a statement of inventorship and of right to grant a patent required in support of this request? (*Answer 'Yes' if:*

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form -

Description 16

Claim(s) -

Abstract -

Drawing(s) 7

10. If you are also filing any of the following, r State how many against each item.

Priority documents -

Translations of priority documents -

Statement of inventorship and right to grant of a patent -

Request for preliminary examination and search (Patents Form 9/77) -

Request for substantive examination (Patents Form 10/77) -

Any other document (please specify) -

11. I/We request the grant of a patent on the basis of this application
Signature *Murphy & Co* Date 14/10/2002
MURGITROYD & COMPANY
12. Name and daytime telephone number of person to contact in the United Kingdom Jamie Allan 01224 706616

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- b) Write your answers in capital letters using black ink or you may type them.
- c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- e) Once you have filled in the form you must remember to sign and date it.
- f) For details of the fee and ways to pay please contact the Patent Office.

1 "Apparatus and a Method for Use in Handling a Load"

2

3 This invention relates to apparatus for use in
4 handling a load which is capable of raising and
5 lowering, or of towing, a load and also handling
6 service cables and/or hoses connected to the load.
7 The invention is particularly, but not exclusively,
8 applicable to the handling of subsea equipment such
9 as grabs.

10

11 Providing services to underwater equipment often
12 involves the provision of a specific bundle of
13 cable(s) and/or hose(s) dedicated to each
14 application. For some applications, it is known to
15 incorporate the service bundle within an armoured
16 hoist rope. This approach has a number of
17 deficiencies. The resulting rope is costly, gives
18 inferior hoisting properties, and by virtue of
19 limitations on the diameter of rope which can be
20 handled the services which can be incorporated are
21 limited. Further, in practice it is impossible with
22 this arrangement to add to the length of the rope or

1 to join different types of materials, for example
2 wire ropes with fibre ropes.

3
4 To avoid the necessity of using the expensive
5 armoured hoist rope, it is known to wind a service
6 cable around a rope, or vice versa, to service
7 underwater equipment. However, due to water currents
8 and/or movement of a ship from which the apparatus
9 operates, the service cable and rope are placed under
10 stress, which can cause the service cables and the
11 rope to pull away from each other, and the service
12 cable to slip or creep down the rope.

13
14 According to an aspect of the present invention there
15 is provided apparatus for use in handling a load
16 comprising a load-bearing rope, a mechanism for
17 paying out and recovering the load-bearing rope, a
18 service cable, a first wrapping device for rotating
19 the service cable around the load-bearing rope as the
20 load-bearing rope is payed out to wrap the service
21 cable around the load-bearing rope, and to unwrap the
22 service cable from the load-bearing rope as the load-
23 bearing rope is recovered, a mechanism for holding
24 and paying out a securing member, and a second
25 wrapping device for wrapping the securing member
26 around the service cable and the load-bearing rope,
27 and to unwrap the securing member from the service
28 cable and load-bearing rope as either of them is
29 recovered.

30

1 The securing member is wound around the service cable
2 and the hoist rope, to hold the service cable
3 relative to the load-bearing rope and to reduce the
4 extent of creeping of the service cable down the
5 load-bearing rope.

6
7 The securing member can be planar, in the form of a
8 strip, tape or ribbon, or can have a circular cross-
9 section, in the form of a rope. In preferred
10 embodiments, the securing member is resilient and is
11 applied to the rope in tension.

12
13 The term "service cable" is used herein to denote a
14 flexible elongate member used for conveying power or
15 data, such as an electrical cable, a fibre optic
16 cable, or a pneumatic or hydraulic hose.

17 Typically, the first wrapping device comprises a
18 service cable drum being arranged for rotation about
19 a drum axis which coincides with the axis of the
20 rope. The cable may be guided by sheaves or pulleys
21 from the drum. Instead of rotating on its axis,
22 cable drum may be static and may have a winding
23 device rotating around it to pay out the service
24 cable. Preferably, the service cable drum has a
25 central aperture through which the load-bearing rope
26 passes.

27
28 The service cable drum may be rotatably mounted on a
29 structural member so that it's axis is not co-
30 incident with the axis of the rope, and so that it is
31 moved in a circular path around the axis of the rope

1 as the cable is being paid out or recovered. Sheaves
2 and/or pulleys may again guide the cable as it is
3 being paid out or recovered. The axis of the service
4 cable drum in such embodiments can be vertical so
5 that it is parallel to the axis of the rope, or
6 horizontal, so that it is perpendicular to the axis
7 of the rope.

8
9 Optionally, the cable drum has an axis which
10 coincides with the axis of the load-bearing rope, the
11 cable drum typically having a central aperture
12 through which the load-bearing rope passes, with the
13 service cable passing over a cable sheave which is
14 mounted for movement in a circular path around the
15 axis of the load-bearing rope.

16
17 Optionally, the securing member drum has an axis
18 which coincides with the axis of the load-bearing
19 rope, the securing member drum typically having a
20 central aperture through which the load-bearing rope
21 passes, the securing member passing over a rope
22 sheave which is mounted for movement in a circular
23 path around the axis of the load-bearing rope.

24
25 Optionally, the first and second wrapping devices
26 include respective arms arranged for rotation about
27 the load-bearing rope. Optionally, the arms support
28 spooling gear.

29
30 Preferably, the securing member leaves the securing
31 ~~member drum and any associated sheaves radially~~

1 outward of the service cable to wind the securing
2 member around the service cable and the load-bearing
3 rope.

4
5 Preferably, the securing member has elastic
6 properties. Typically, the securing member is made
7 of neoprene with a nylon reinforcing strip or sheath.
8 The securing member can have a nylon reinforcing
9 strip woven into it to limit the maximum extension of
10 the member, or can be sheathed in nylon. The
11 securing member may be planar, and may incorporate an
12 adhesive to hold the securing member to the rope.

13
14 Typically, the mechanism for paying out and
15 recovering the load-bearing rope includes a rope
16 winch, from which the load-bearing rope passes over a
17 rope sheave and thereafter extends to the load along
18 a substantially straight axis.

19
20 Optionally, the rope winch, the cable drum, the
21 securing member drum, and any winding devices each
22 have a respective driving motor. Alternatively, the
23 rope winch, the cable drum, the securing member drum
24 and any winding devices are driven by a single source
25 through appropriate mechanical linkages.

26
27 Typically, the service cable and/or the securing
28 member are payed out close to the axis of the rope.

29

1 Typically, the service cable comprises an electrical
2 cable, a fibre optic cable, a pneumatic cable or a
3 hydraulic hose.

4

5 Preferably, the load-bearing rope is a hoist rope
6 used for raising and lowering a load. Typically, the
7 load-bearing rope is a towing rope used for paying
8 out, towing and recovering a load.

9

10 Optionally, more than one service cable is provided,
11 each typically extending from a respective drum.

12

13 Optionally, the cable drum and the securing member
14 drum are both coaxial with the load-bearing rope, one
15 being positioned above the other and the load-bearing
16 rope extending through the centre. Alternatively,
17 one of the cable drum and the securing member drum is
18 coaxial with the load-bearing rope and the other is
19 arranged for movement in a circular path around the
20 rope on a winder mechanism. Alternatively, neither
21 the cable drum nor the securing member drum is
22 coaxial with the load-bearing rope and both are moved
23 in a circular path around the rope on winder
24 mechanisms. In any of these cases, the axes of the
25 cable and securing member drums can be either
26 parallel to or perpendicular to the axis of the hoist
27 rope.

28

29 Preferably, the apparatus also includes a guide means
30 for guiding the load-bearing rope.

31

1 Typically, the guide means comprises at least one
2 roller or sheave. Preferably, more than one roller
3 is provided. Optionally, four rollers are provided
4 around the circumference of the rope forming a roller
5 cage which encloses the load-bearing rope.

6
7 According to a second aspect of the present invention
8 there is provided a method for use in handling a
9 load, comprising:

10
11 paying out a load-bearing rope;
12 wrapping a service cable around the load-bearing rope
13 as the load-bearing rope is payed out;
14 wrapping a securing member around the service cable
15 and load-bearing rope as the load-bearing rope is
16 payed out;
17 and subsequently unwrapping the securing member and
18 service cable from the load-bearing rope as the load-
19 bearing rope is recovered.

20
21 Preferably, the securing member is wound around the
22 load-bearing rope in the opposite direction to the
23 service cable, typically over the top of the service
24 cable.

25
26 Winding the service cable and the securing member in
27 opposite directions could more strongly fix the
28 service cable to the load-bearing rope.

29
30 Optionally, the securing member is wrapped around the
31 rope and service cable(s) only at intervals along the

1 rope, but in most embodiments the securing member is
2 wrapped continuously down the length of the rope as
3 it is payed out. Such intermittent wrappings can
4 comprise discrete lengths of rope, tape or ribbon,
5 optionally formed of elastic material and optionally
6 with an adhesive element, in order to avoid the need
7 to wrap the securing member continuously around the
8 rope and cable. In some embodiments, the tape can be
9 applied intermittently on top of the securing member,
10 so that there are several layers of securing member
11 at certain points on the rope, for example at the
12 lower end of the rope that will be at the deepest
13 depths. Typically the tape is applied at intervals
14 eg every 100 - 300 metres.

15

16 Examples of apparatus and a method for use in
17 handling a load in accordance with the invention will
18 now be described with reference to the drawings, in
19 which:-

20

21 Fig. 1 is a schematic perspective view

22 illustrating the principle of operation of a
23 first example of the invention;

24 Fig. 2 is a side view showing details of a part
25 of the apparatus of Fig. 1;

26 Fig. 3 is a cross-section view of an embodiment
27 of Fig 1;

28 Fig. 4 is a cross-section view of an alternative
29 embodiment of Fig. 1;

30 Fig. 5 is a schematic perspective view of a

31 ~~second example of the invention;~~

1 Fig. 6 is a more detailed side view of a part of
2 Fig. 5;
3 Fig. 7 is a cross-section view of an embodiment
4 of Fig. 5;
5 Fig. 8 is a cross-section view of an alternative
6 embodiment of Fig. 5; and
7 Fig. 9 is a schematic perspective view of Fig.
8 1, adapted for towing rather than lifting.

9
10 Referring to Fig. 1, a hoist rope 1 extends from a
11 hoist rope winch 13 over a hoist rope sheave 4 to
12 support a load (not shown) for raising and lowering.
13 The hoist rope 1 may be any suitable form of hoist
14 rope such as flexible steel wire rope or synthetic
15 fibre rope, for example of "Kevlar". A service cable
16 2 is held on a service cable drum 3, which is
17 rotatably mounted around the rope 1. One end of the
18 cable 2 extends from the drum 3 and is wound around
19 the rope 1. A securing member in the form of a
20 planar strip 17 of elastic material such as neoprene
21 is held on a rope drum 30, which is also rotatably
22 mounted for movement in a circular path around the
23 rope 1. An end of the strip 17 extends from the rope
24 drum 30 and is wound around the entwined rope and
25 service cable 2. The drums 3, 30 are preferably
26 rotatable independently of each other, but they could
27 be rotatable together. Additional service cables
28 could be wound around the hoist rope 1 from
29 additional respective drums rotatably mounted around
30 the hoist rope 1. The securing member drum 30 should
31 be mounted to wrap the strip 17 around the only or

1 outer service cable 2 (i.e. on an arm which extends
2 outward of the service cable drum(s)).

3

4 The strip 17 is preferably elastic, but this is not
5 essential.

6

7 Fig. 2 shows a more detailed view of the connection
8 of the cable drum 3 with the rest of the apparatus.
9 The service cable drum 3 is removably mounted on a
10 hub motor 11 which is carried on the end of an arm 18
11 rotatably mounted on a fixed frame 20 and driven by a
12 motor 10. The frame 20 is attached to the rope
13 sheave 4.

14

15 Fig. 3 is also a more detailed version of Fig. 1,
16 also showing the strip drum 30. The strip drum 30 is
17 attached to the end of an L-shaped arm 6. The arm 6
18 has a horizontal limb 6a extending radially from the
19 axis of the apparatus to a point outward of the cable
20 drum 3 and a vertical limb 6b on the end of which the
21 strip drum 30 is located, to suspend the strip drum
22 30 radially outward and below the cable drum 3. This
23 ensures that the securing member 17 is always wound
24 the top of the service cable 2 and that the securing
25 member 17 and the cable 2 do not become entangled.

26

27 In use, the winch 13 is rotated to lower the hoist
28 rope 1. At the same time, the motor 10 is activated
29 to rotate the arm 18 around the hoist rope 1, and the
30 arm 6 is also rotated (typically by its own similar
~~31 motor arrangement, or it may be powered from the~~

1 motor 10). The arm 6 is typically rotated in the
2 opposite direction to the arm 18, which rotates the
3 cable drum 3 and the strip drum 30 around the hoist
4 rope 1, to wind the strip 17 around the hoist rope 1
5 in the opposite direction to the winding of the
6 service cable 2. The service cable 2 is thus
7 entwined around the hoist rope 1 which is attached to
8 a load, and the strip 17 is wound around the entwined
9 hoist rope 1 and cable 2. Thus, the hoist rope 1 can
10 take the strain of an object lifted without placing
11 the service cable 2 under strain, and the strip 17
12 binds the service cable 2 to the hoist rope 1,
13 preventing it from slipping down the hoist rope 1.

14
15 In most preferred embodiments the strip has an
16 elastic component and is applied to the rope in
17 tension, so that once applied the strip keeps the
18 cable close to the rope. The tension applied to the
19 strip by e.g. a self tensioning device on the
20 wrapping mechanism is not generally sufficient to
21 overcome the tension in the main hoist rope, and so
22 does not affect the assembly of the rope, cable and
23 securing member.

24
25 To recover the hoist rope 1 and the service cable 2,
26 the procedure is simply reversed. The direction of
27 the motor(s) is reversed to rotate the arms 6, 18 in
28 the opposite directions, to wind the service cable 2
29 and the securing member 17 back onto their respective
30 drums. If tape has been used, this is unwound or cut

1 (by hand or automatically) from the entwined
2 ropes/cable(s).

3
4 Fig. 4 shows an alternative embodiment, where the
5 securing member drum 30 is located on top of the
6 horizontal limb 6a. The securing member 17 extends
7 over the limbs 6a and 6b, guided by guides 9, 11,
8 which are typically sheaves or rollers. The guide 9
9 is at the apex of the arm 6; guide 11 is on the end
10 of the vertical limb 6b. The securing member 17
11 extends from the guide 9 towards the rope 1 on the
12 exterior of service cable 2, in a similar way to the
13 Fig. 3 embodiment.

14
15 Fig. 5 shows a schematic diagram of an alternative
16 embodiment. In this modification, the service cables
17 2 and the securing member 17 are each provided with a
18 respective storage drum 16, 15 stacked on top of each
19 another with their axes parallel to the axis of the
20 rope 1. The service cable 2 and the securing member
21 17 each have a respective sheave 5, 14 which may
22 suitably be carried on a common supporting frame for
23 rotation in unison. Alternatively the frames may be
24 separate so that the sheaves 5, 14 can rotate
25 independently of one another. The apparatus may be
26 further modified by adding further drums and sheaves
27 to handle more service cables.

28
29 Fig. 6 shows the cable drum 16, the member drum 15
30 and associated parts in greater detail. The rope
~~31 sheave 4 is journalled to a fixed frame 20 that is~~

1 secured to any suitable supporting structure such as
2 an A-frame (not shown). The member drum 15 and the
3 cable drum 16 are rotatably mounted one above the
4 other on the lower part of the frame 20.

5
6 The inner end of the service cable 2 can be connected
7 to any appropriate service if needed by any
8 convenient means (not shown) but is otherwise
9 connected to the cable drum 16.

10
11 The member drum 15 is driven in rotation by a motor
12 6. Optionally, a shaft (not shown) passes through
13 the centre of the member drum 15 and the shaft meshes
14 with a cog engagement mechanism inside the bore of
15 the member drum 15 to rotate the member drum 15. The
16 cable drum 16 is could be driven in rotation by a
17 separate motor (not shown); alternatively, the cable
18 drum 16 could be driven in rotation from the motor 6.
19 This could be done from an inner shaft, inside the
20 shaft that drives the member drum 15, connecting
21 inside the bore of the cable drum by a similar
22 engaging cog mechanism. A gear mechanism would
23 preferably be provided to rotate the inner shaft in
24 the opposite direction to the outer shaft.

25
26 The member sheave 14 is journalled on a mounting
27 frame 9 that is rotatable about the fixed frame 20 by
28 means of a motor 7. Likewise, the service cable
29 sheave 5 is journalled on a mounting frame 50 that is
30 rotatable about the fixed frame 20. Again, the
31 service cable sheave 5 could be driven in rotation

1 from the same motor 7 via an interior shaft and cogs,
2 or from a separate motor (not shown).

3

4 The motors 6 and 7 are driven at speeds related to
5 the axial speed of the hoist rope 1. The speed
6 correlation may be fixed. Preferably, however, this
7 correlation will be controllable to alter both the
8 length of twist (pitch) of the lay of the member 17
9 on the hoist rope 1, and the tension in the securing
10 member 17. The pitch and the lay of the cable 2 on
11 the hoist rope 1 will also be controlled in a similar
12 way, whether these are controlled by the same motors
13 6, 7 or different ones not shown.

14

15 Fig. 8 shows a more detailed view of the embodiment
16 of Fig. 5. The service cable 2 extends from the rope
17 drum 16 over guides 32, 34 to pass the service cable
18 2 around the lower lip 36 of the service cable drum
19 16 without dragging on the lip 36. The guides 32, 34
20 are located on an arm (not shown) adapted for
21 rotation around the cable drum 16, as shown in Fig.
22 6.

23

24 Likewise, the securing member 17 extends over a
25 second L-shaped arm 6 (only the vertical portion of
26 the arm is shown) over guides 9, 11. In this
27 embodiment the securing member is in the form of an
28 elasticated rope. The guides 9, 11 are typically
29 rollers or sheaves. The arms are preferably
30 rotatable independently of each other.

31

1 After passing over their respective guides, service
2 cable 2 and securing member 17 extend towards the
3 hoist rope 1 to wind around the rope 1, as in the
4 other embodiments.

5
6 Fig. 7 shows an embodiment similar to that of Fig. 4,
7 but having the rope drum 15 positioned around the
8 hoist rope 1, with its axis aligned with the hoist
9 rope's axis. The service cable 2 extends over a
10 rotatable arm (not shown) and over guides 32, 34,
11 which are typically rollers or sheaves, as shown and
12 described above for the Fig. 8 embodiment.

13
14 Fig. 9 illustrates the example of Fig. 1 modified for
15 use in a marine towing application, for example in
16 paying out, towing and recovering a sensor array such
17 as a sonar sensor or seismographic surveying sensor,
18 the sensor array being towed underwater or on the
19 surface. The service cable drum 3 is hinged to the
20 main structure of the towing vessel (not shown) and
21 can be tilted to a desired towing angle by hydraulic
22 or other mechanisms.

23
24 Other modifications may be made within the scope of
25 the invention. For example, the positions of the
26 hoist rope 1 and the service cable 2 could be
27 reversed so that the hoist rope 1 is on a drum and
28 the cable 2 is fed from a winch, to wind the hoist
29 rope 1 around the service cable 2. When tension is
30 put on the hoist rope 1, the hoist rope 1 straightens

1 and the service cable 2 becomes wound around the
2 hoist rope 1 in any case.

3

4 More service cable drums could be provided: in the
5 embodiment of Fig. 1, further service cable drums
6 could be provided rotatably mounted around the hoist
7 rope 1; in the embodiment of Fig. 5 there could be
8 further arms extending radially outward of the hoist
9 rope 1 axis, each with a respective cable sheave.

10

11 Further rollers and/or guide sheaves could be used to
12 conveniently position the cable relative to the rope,
13 e.g. to deflect one away from the axis of the other,
14 or to pass the cable around the lip of an arm to
15 align the cable with the rope.

16

17 The securing member 17 is preferably wrapped around
18 the hoist rope 1 in the opposite direction to the
19 wrapping of the outer or only service cable 2, but
20 this is not essential, and the securing member could
21 be wrapped onto the rope and cable at a different
22 pitch to the cable. Tape could also be wrapped
23 around the entwined cable/ropes, either at intervals
24 or in a long continuous length. To unwind the
25 cable/ropes, the tape may be unwrapped or cut
26 therefrom.

27

28

29

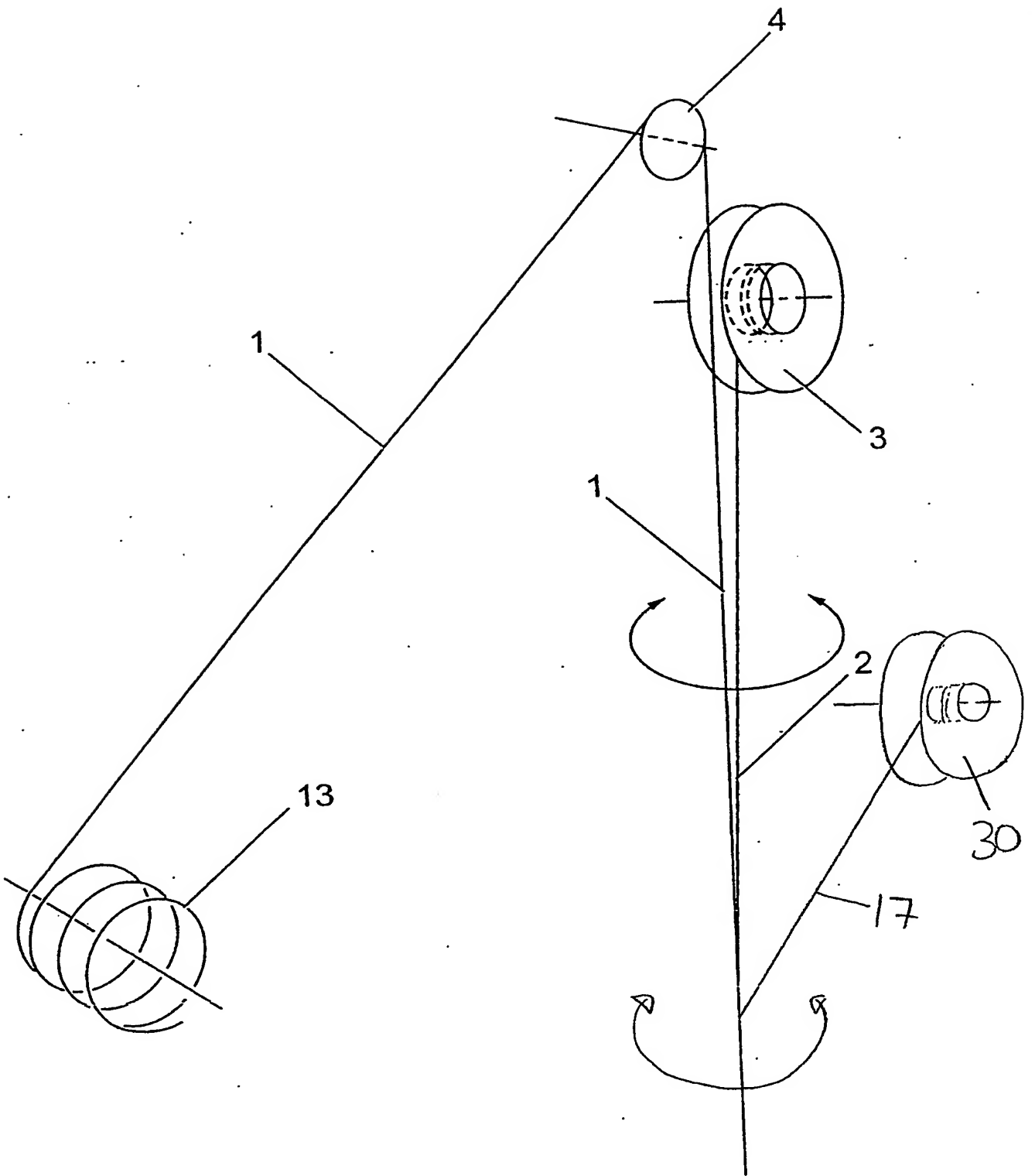


Fig. 1

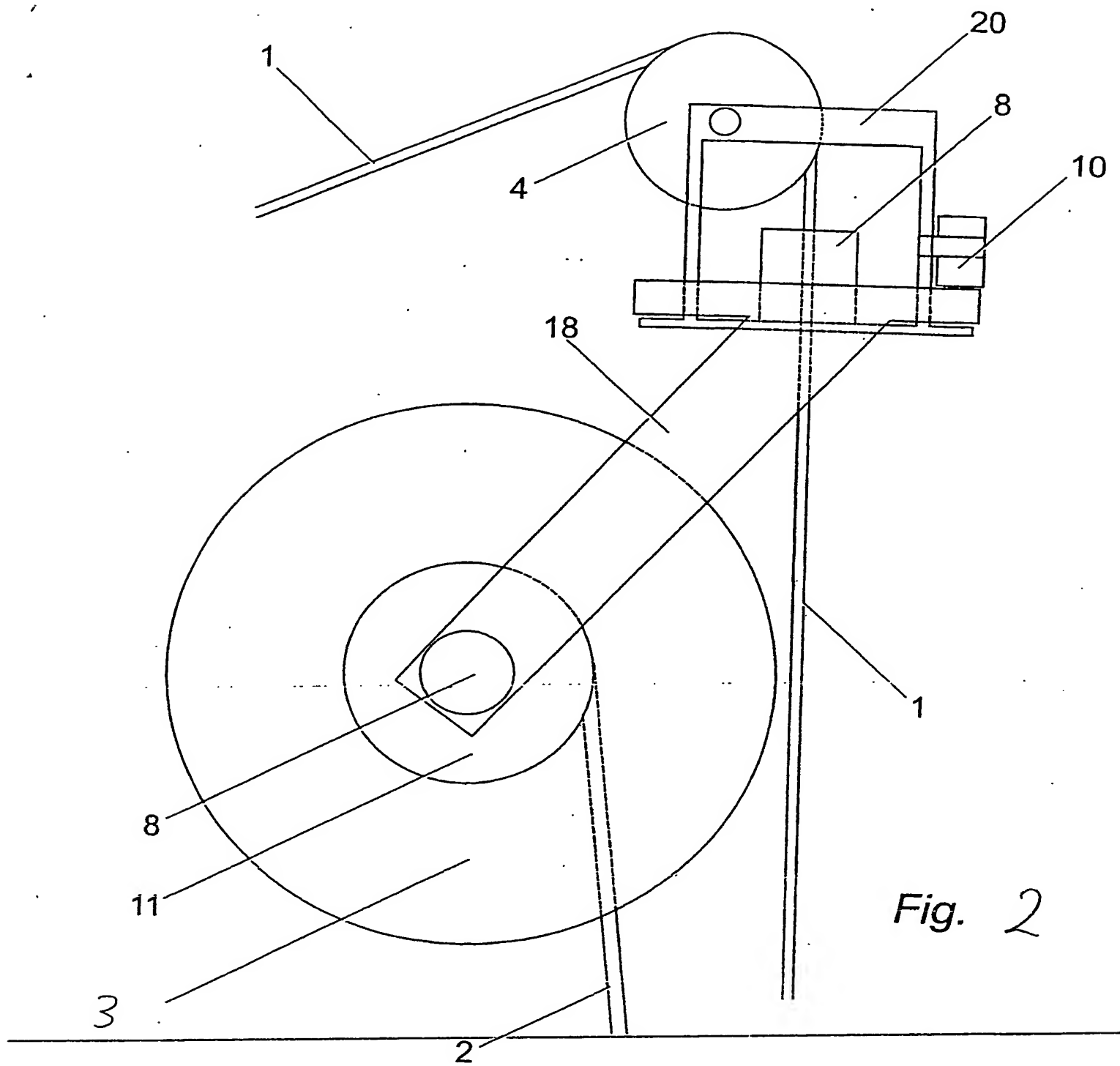


Fig. 2

FIG 3

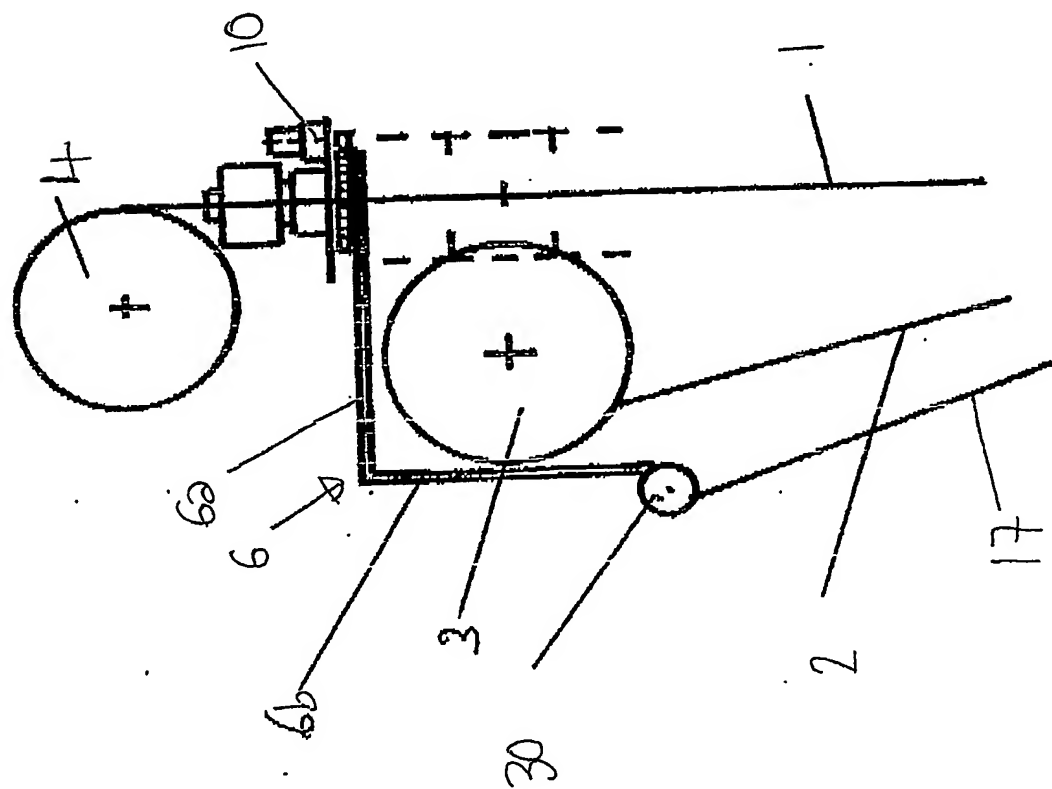
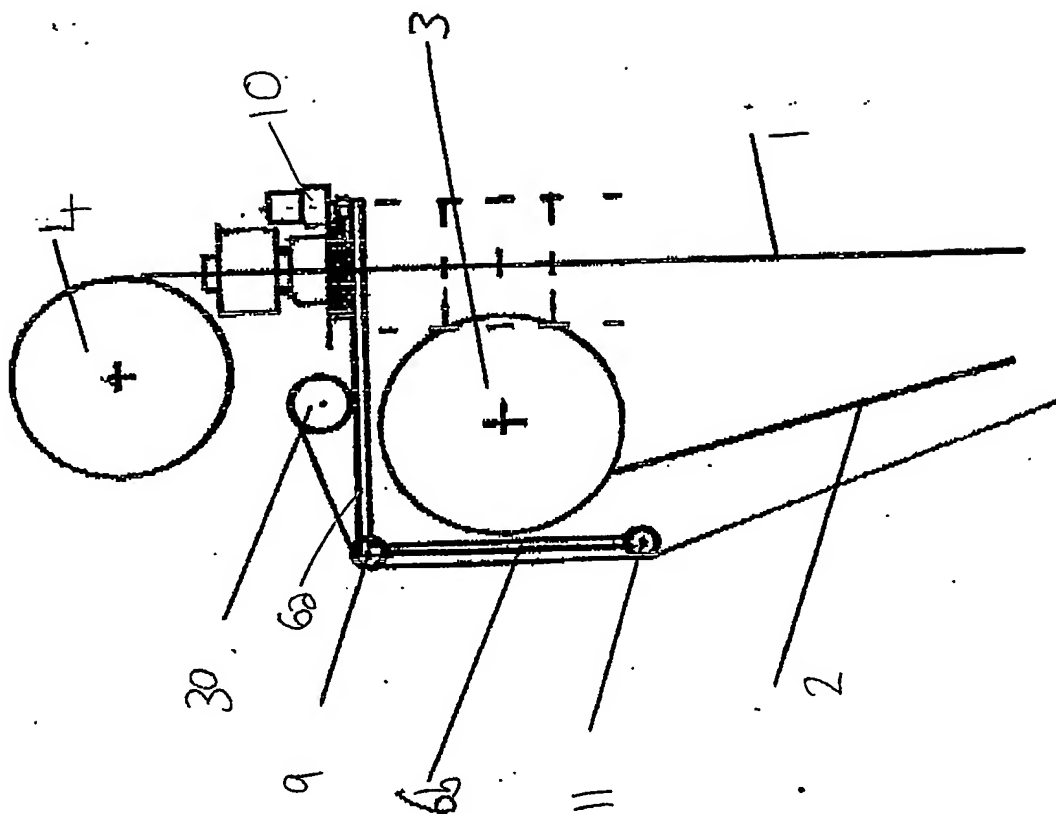


FIG 4



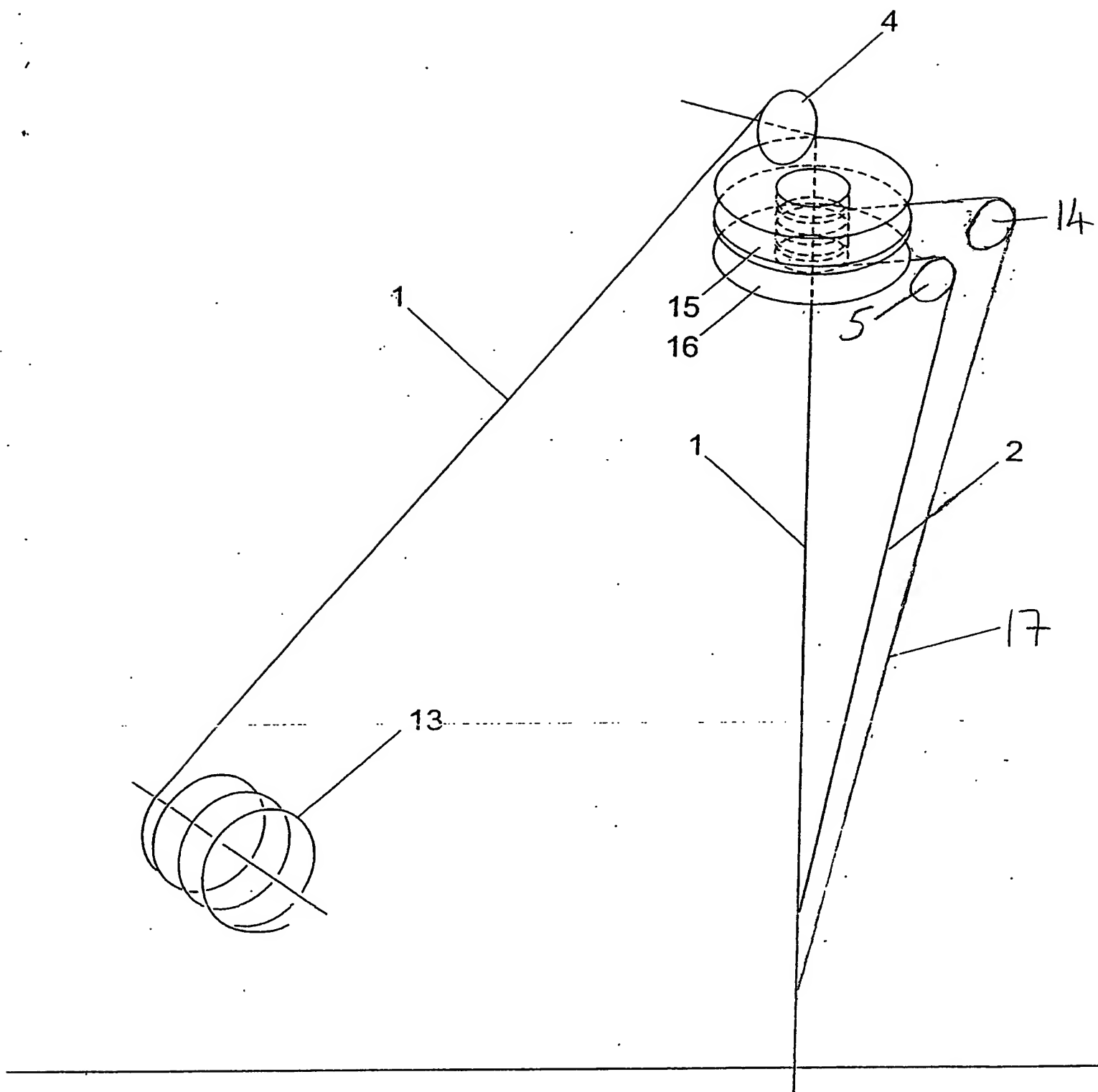


Fig. 5

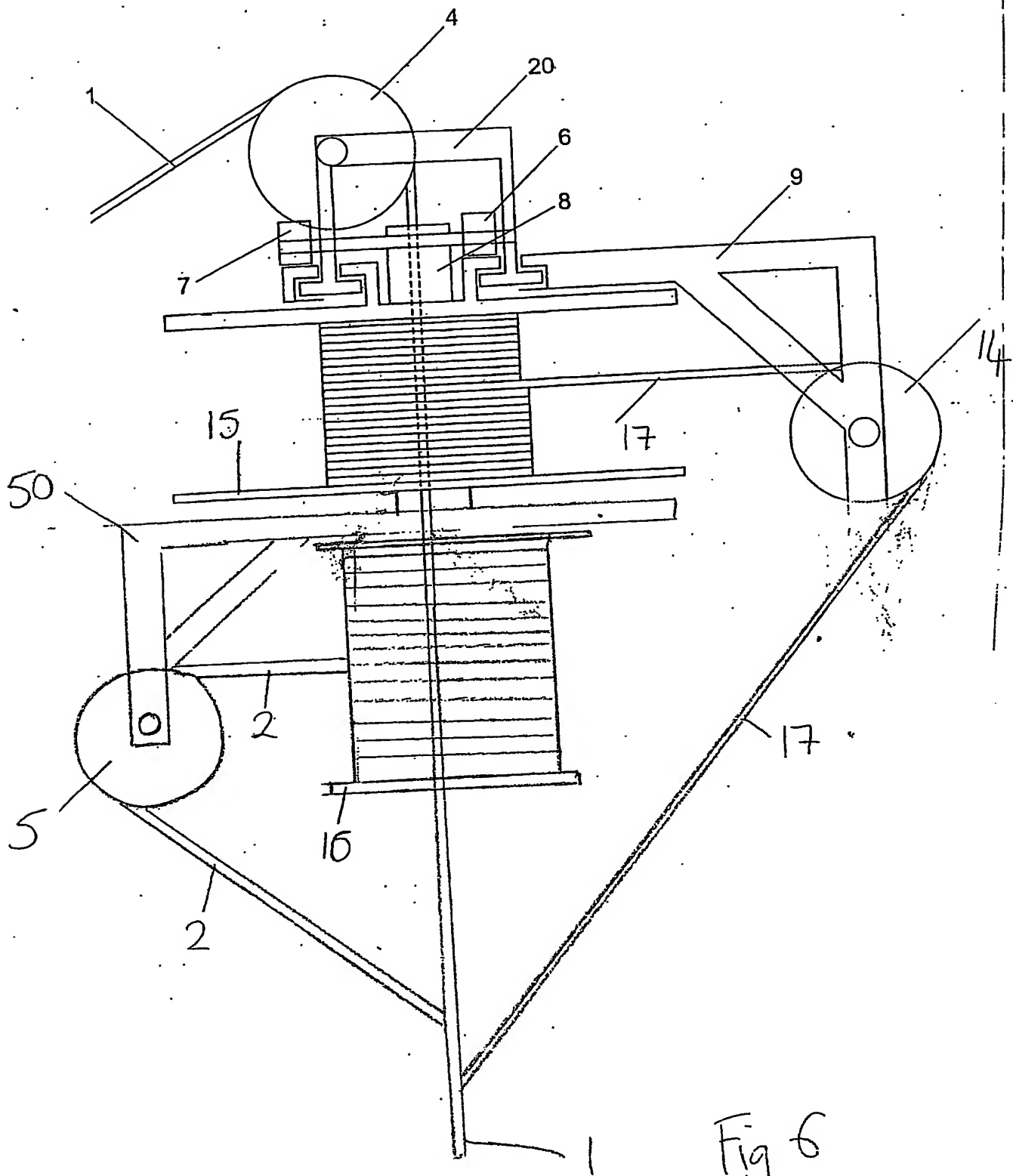
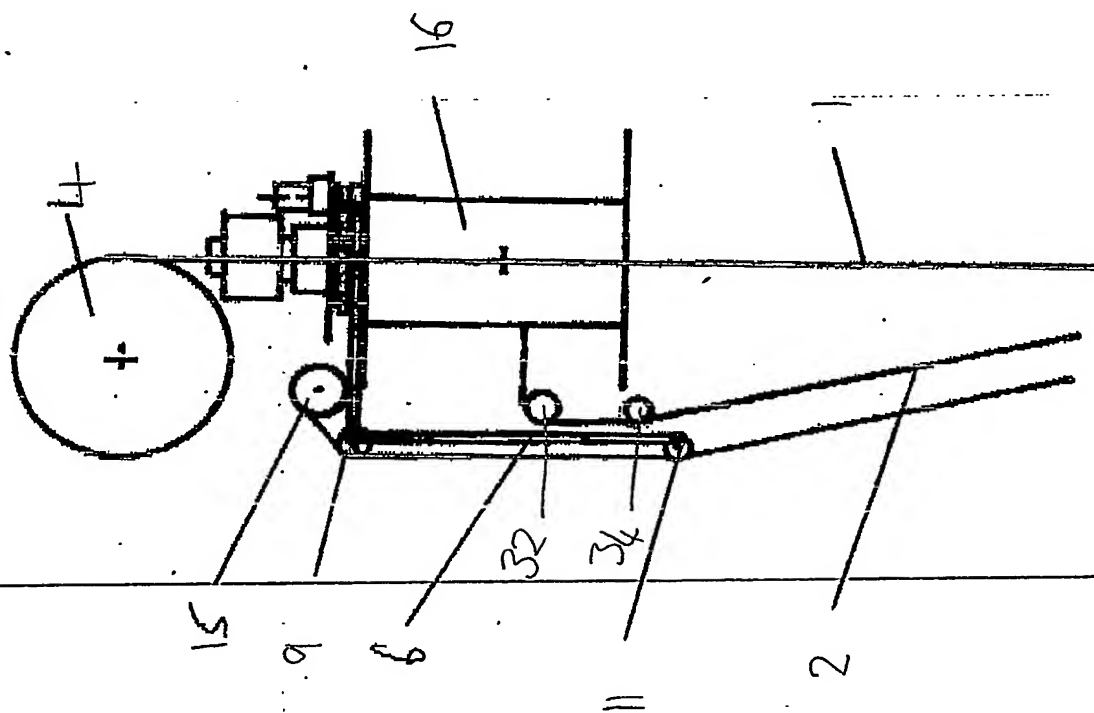
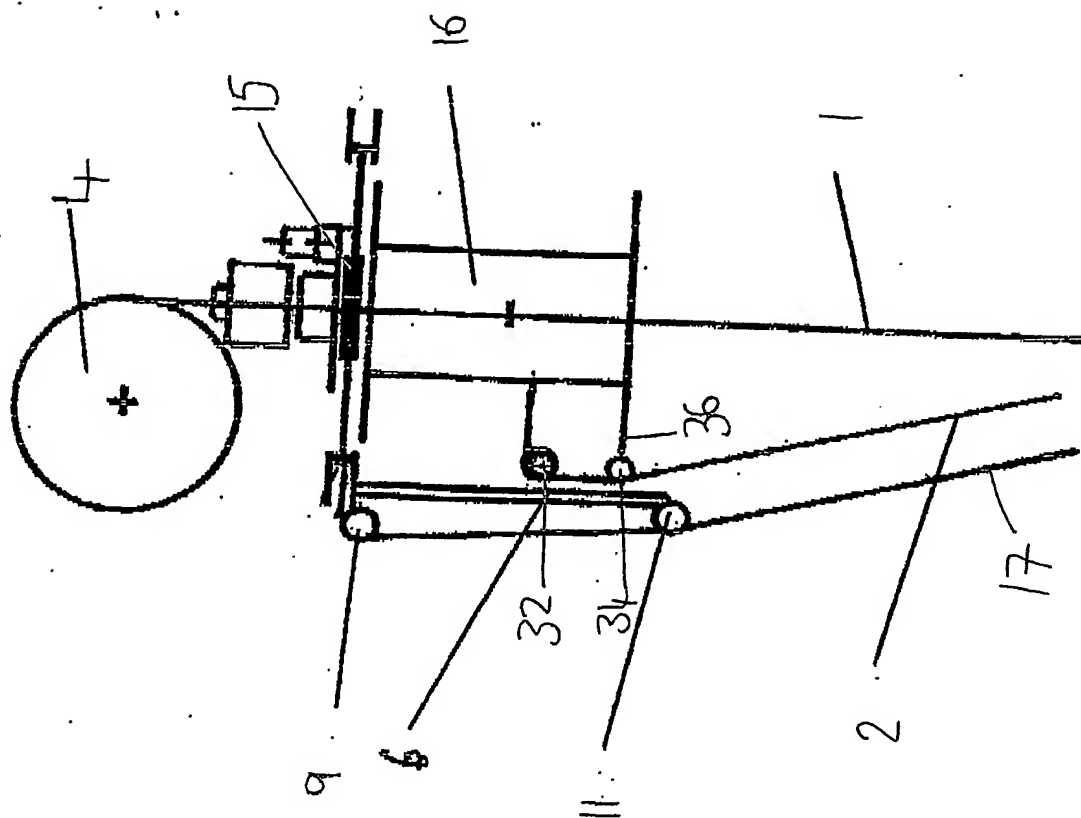


Fig 6



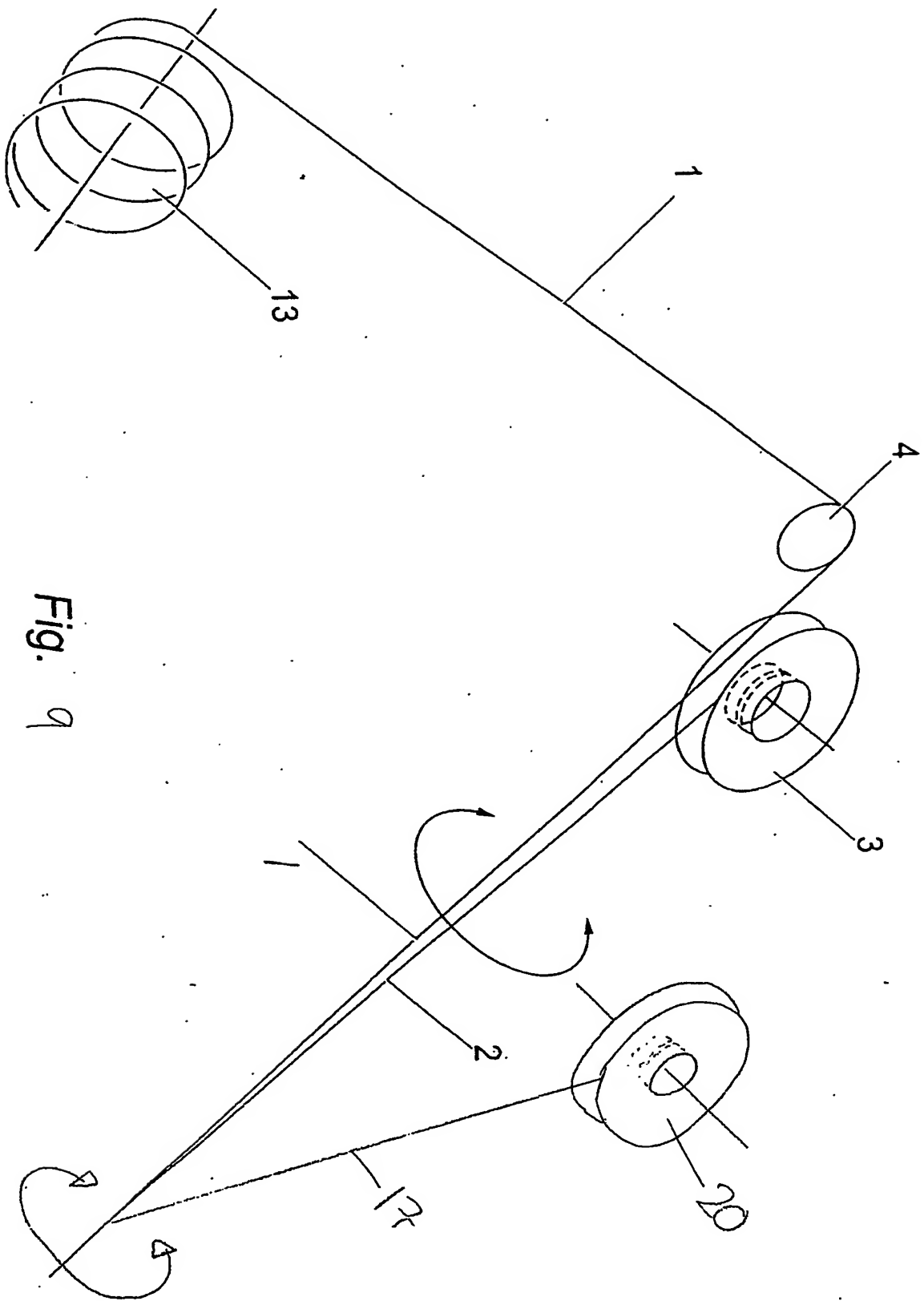


Fig. 9

PCT Application

GB0304317



**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☒ **BLACK BORDERS**

☒ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

☒ **FADED TEXT OR DRAWING**

☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**

☐ **SKEWED/SLANTED IMAGES**

☒ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**

☐ **GRAY SCALE DOCUMENTS**

☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**

☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.